A Deep Learning-based Intelligent Medicine Recognition System for Chronic Patients

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ABSTRACT

This paper proposes a shrewd medication acknowledgment framework dependent on profound learning methods, named ST-Med-Box. The proposed framework can help persistent patients in taking different meds effectively and in trying not to take some unacceptable meds, which may cause drug communications, and can give other medicine related functionalities like suggestions to take prescriptions on schedule, medicine data, and ongoing patient data the board. The proposed framework comprises of a keen medication acknowledgment gadget, an application running on an Android-based cell phone, a profound getting the hang of preparing worker, and a cloud-based administration stage. Right now, eight distinct prescriptions can be perceived by the proposed framework. The exploratory outcomes show that the acknowledgment precision comes to 96.6%. Thusly, the proposed framework can viably lessen the issue of medication collaborations brought about by consuming wrong medications, accordingly diminishing the expense of clinical therapy and giving patients with ongoing infections a protected medicine climate.

INTRODUCTION

CURRENTLY, the world's society is aging. Among the 7.5 billion people in the world, the elderly population accounts for 600 million, including 480 million people with chronic diseases. According to statistics from the World Health Organization (WHO), the average elderly person suffers from 1.4 chronic diseases, and the typical medication dosage of an elderly person is five times that of a younger person.

Elderly people are also seven times more likely to take the wrong medicine because of declining physiological functions. The WHO also indicates that one-third of the world's deaths are caused not by diseases themselves but by the incorrect use of drugs, and the costs associated with such improper drug use amount to nearly 28.5 billion U.S. dollars every year.

Due to the abovementioned problem of deaths caused by the improper use of drugs, the smart medicine pillboxes available on the market are constantly being updated. For example, the PillDrill , a smart medicine pillbox, can help users conveniently store and distribute medication and has a reminder

function to remind users who forget to take their medicine.

However, a patient cannot know whether the medications he or she has taken are correct. Due to the wide variety of drugs used for patients with chronic diseases, their classification is obviously a complex task, and misidentification of medications caused by negligence may lead to the possibility of taking the wrong medicine.

Taking the wrong medicine may result in harmful interactions or offset the intended effects of the drugs, leading to further serious consequences such as acute complications. To address this problem, this paper proposes a deep-learning-based intelligent medicine recognition system, named ST-Med-Box, that can recognize medications and remind patients with chronic diseases when to take their medications.

By using the proposed system, patients with chronic diseases can know whether a drug is taken correctly the first time, thus reducing the probability of taking the wrong medicine and the cost of social medical care.

RELATED WORKS

Ribeiro et al. proposed a medication box acknowledgment framework that received a three-stage (standardized identification acknowledgment, text acknowledgment, and highlight coordinating) approach. Their proposed framework utilized a camera mounted on a gadget and utilized an Android framework to accurately perceive

medication bundles to give individuals encountering troubles (like old people and people with visual disabilities) with related prescription bundling data. Standardized tag location and optical person acknowledgment (OCR) were utilized to perceive the names on the medication bundles. Their proposed framework made an acknowledgment progress of up to 80%. Be that as it may, the framework had an acknowledgment vulnerable side on account of medication bundles bearing a similar name however with various substance (number of tablets, dose, as well as course of organization). Wang et al. additionally introduced a profound learning-based acknowledgment approach for perceiving drug rankle bundles.

Yu et al. introduced a precise and programmed pill acknowledgment framework that joined engraving extraction and depiction to utilize engrave data. Also, a loopy-conviction proliferation based picture division approach was applied to the engraving on the pill to take care of the issue of disjointed and coarse strokes. The trial results showed that this pill acknowledgment framework accomplished exactnesses of 90.46% on the high level and 97.16% on the best five positions.

PROPOSED SYSTEM

Design Concept of the Proposed System

To resolve the issues presented by patients with persistent infections taking numerous meds for those sicknesses, we propose a wise medication acknowledgment

framework dependent on profound learning innovation. This framework can consequently recognize pills and help patients with persistent sicknesses in understanding the measurement of their drugs and other related data, hence alleviating the issue of patients taking some unacceptable meds.

At present, brilliant medication pillboxes are regularly used to arrange medications and help patients take medication and join an assortment of medications, yet they disregard the possible unfriendly impacts of putting various medications together. To resolve this issue, we utilize profound learning-based picture acknowledgment innovation to accomplish prompt numerous medication situation and moment acknowledgment and to give voice clarifications of prescription data.
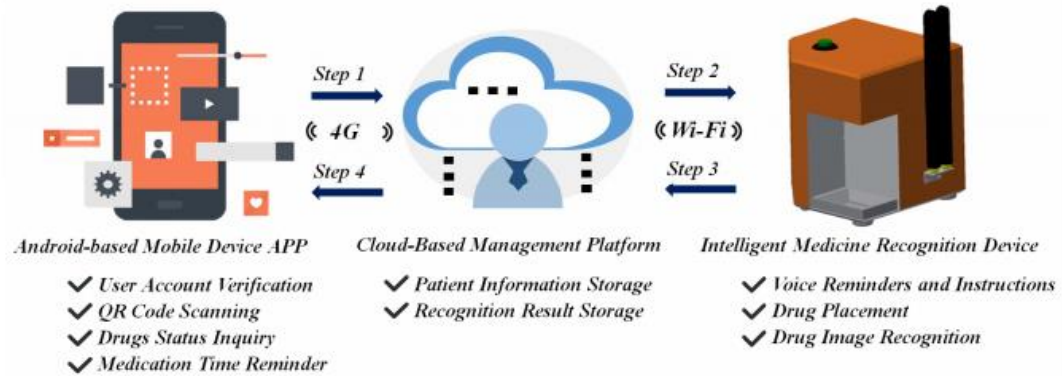

Fig. 1. Overview of the proposed system.

Fig. 1 shows an outline of the proposed framework. The proposed framework comprises of a canny medication acknowledgment gadget, an application running on an Android-based cell phone, a profound picking up preparing worker, and a cloud-based administration stage. As displayed in Fig. 1, the proposed framework is planned as a customized administration for patients with different constant sicknesses taking numerous meds. The proposed framework is presented as follows

Stage 1: First, a client signs in to their record through the record confirmation component of the Android-based cell phone application. After effectively signing in, the client can tap on the QR code choice in the Android cell phone application to examine the QR code on a medication bundle to acquire the prescription data. Then, at that point, that medicine data is communicated over the 4G organization to a cloud-based administration stage for capacity. Medication data, (for example, the medication name, medicine time, and measurements) can be checked through a site.

Stage 2: The cloud-based administration stage communicates the prescription data acquired from the QR code on the medication bundle to the proposed insightful

medication acknowledgment gadget over a Wi-Fi organization. The proposed smart medication acknowledgment gadget gives a voice brief to remind the patient to take their medication. Then, at that point, the patient places the medication in the acknowledgment area of the proposed shrewd medication acknowledgment gadget

and presses the catch to perceive the pills. After the acknowledgment interaction is finished, the current prescription status (the drug is right, the prescription is inaccurate, more medication should be taken, less medication should be taken, or other related medicine data) will be declared to the patient by voice.
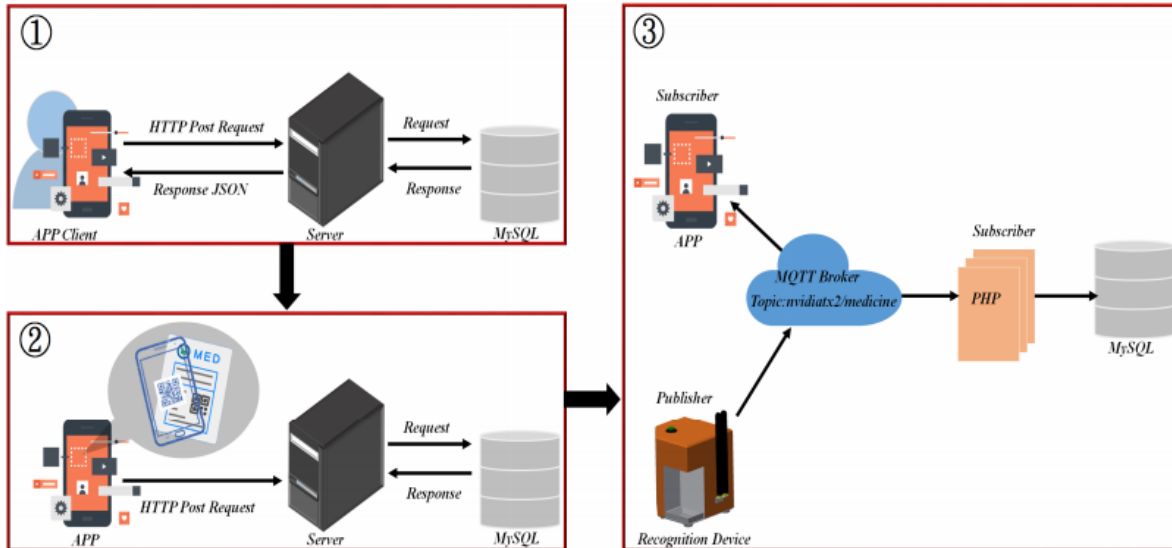

Fig. 3. Data transfer process between the components of the proposed system via the MQTT and HTTP protocols.

Stage 3: The proposed insightful medication acknowledgment framework sends the acknowledgment results back to the cloud-based administration stage over the Wi-Fi organization. In this way, relatives or the patient can check the patient's medicine records (drug name, measurement, and genuine prescription time) through the site.

Stage 4: The Android-based cell phone can get drug records from the cloud-based administration stage over the 4G organization. Thusly, relatives or the patient can likewise in a flash view the patient's prescription records (drug name, dose, and genuine medicine time) through the Android

cell phone application to guarantee legitimate administration of ongoing infections.

CONCLUSION

Persistent patients, remembering 480 million older individuals for the present reality, experience the ill effects of an assortment of sicknesses. In the therapy of various persistent sicknesses, numerous medications are required, and physiological capacities decrease. Intellectual capacity is diminished, perhaps making patients take some unacceptable medication. Consequently, older individuals have become a high-hazard bunch for unfavorable medication occasions.

To take care of the issue of taking some unacceptable medication, in this paper, we have effectively fostered a wise medication acknowledgment framework named ST-Med-Box dependent on profound learning innovation. This framework can perceive sedates and convey acknowledgment brings about an orderly and pragmatic way. The constant sickness drug acknowledgment pace of the proposed framework comes to 96.6% or higher; in this manner, it can assist patients with taking their prescriptions all the more securely and safely.

The proposed framework can consequently give notices expressing the names of medications and demonstrating medicine times to resolve the issue of omissions in human judgment. Also, the proposed framework fuses a cloud-based data set to furnish patients with extra coordinated data administrations.

Subsequently, when utilizing the proposed framework, ongoing patients don't have to stress over neglecting to take their medication. They need just download the proposed Android-based cell phone application and output the QR codes on their medication bundles to store the relating prescription data. Then, at that point, they can get to related administrations, like medicine updates and records. Therefore, the proposed framework can successfully diminish the issue of medication cooperations brought about by consuming wrong medications, in this way lessening the expense of clinical therapy and giving patients with persistent sicknesses a protected drug climate.

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